Some Statistical Issues in the Analysis of Crack Growth Under Random Loads

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Abstract: Life and degradation tests are commonly used to assess fatigue of materials. Most of these test are usually run at fixed levels of load. Product in the field, however, see random levels of load which could be described by a stochastic process. In this talk we will describe important statistical aspects of degradation laboratory test data from units subject to random levels of load. We will use published experimental data on aluminum specimens subject to random loads to illustrate some of the difficulties in analyzing this kind of data. The parameters of the stochastic process, determining the random load, might not completely characterize the observed crack growth. Similar units observed under different realization of the same stochastic process can display quite different degradation behaviors which can't be explained by unit to unit variability.

Key words: Random load, history length, load sequence.